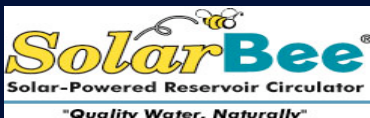


Comments for the NTP: Research on Mold & Human Health

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**Recycling Nutrients to Prevent HABs
& Increase Primary Production**



Overview

- **Humans are Exposed to a Complex Mixture**
- **Synergistic Effects from Mixture Components**
- **Biotoxin-Associated Illness**
- **Inappropriate “Position Papers”**
- **Animal & Human Research Needed**



Humans are Exposed to a Complex Mixture

- Water intrusion or leaks in buildings cause microbial amplification
- Spores & microbial fragments are released to air
- Humans inhale a complex mixture:
 - fungi
 - mycotoxins
 - LPS
 - antigens
 - bacteria
 - endotoxins
 - VOCs



Mixture Components can have Synergistic Effects

- *Streptomyces californicus* & *Stachybotrys chartarum*
 - synergistic release of TNF α , IL6 in mouse RAW264.7 macrophages
 - Huttunen *et al.*, EHP, 112/6 (2004) 468-476
- Inflammation is a common pathway through which mixture components induce illness



Chronic Exposure Causes a Biotoxin-Associated Illness

- Described by Shoemaker & Hudnell
 - *Pfiesteria*
 - Cyanobacteria
 - Mold
 - Post Lyme Disease
- Characterized by
 - Multisystem symptoms
 - Neurologic deficits
 - Visual Contrast Sensitivity (VCS)
 - Hormonal abnormalities
 - Leptin, MSH (POMC), MMP9
 - Inflammation
 - Cytokines, chemokines, complement



A Few Individuals in Large Organizations have Written Inappropriate Position Papers

- ACOEM - "...delivery by the inhalation route of a toxic dose of mycotoxins in the indoor environment is highly unlikely at best, even for the hypothetically most susceptible subpopulations."
- Based on a mouse study, 3 weeks exposure, cumulative dose 2.8×10^5 *S chartarum* spores/kg body weight & false assumptions about contaminated indoor concentrations



A Few Individuals in Large Organizations have Written Inappropriate Position Papers

- ACOEM failed to consider:
 - NOAEL not identified ($<3 \times 10^4$ *S chartarum* spores/kg body weight)
 - Fungal fragment concentrations exceed spore concentrations by 320 fold
 - Young adult mice (less susceptible)
 - Human illness follows chronic exposure
 - Risk assessment not done (uncertainty fact.)
 - Previously ill humans are sensitized
 - Complex mixture synergistic effects



An Understanding of the Health Risks For Humans Requires a Combination of Human & Animal Studies

- The NTP should team with human studies groups to more fully characterize the health risks
 - NIEHS Clinical Research Unit
 - NIEHS Epidemiology Unit
 - Others



Thank You



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